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Environment Ontario legacy

Fall, 1984

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Ontario's quest for clean air

Ministry of the Environment
Ontario

Hon. Andrew S. Brandt, Minister

Allan E. Dyer, MD
Deputy Minister

Environment Ontario legacy

Fall 1984 Vol. 12, No. 4

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Editor .....Robert Koci
Director of Communications Branch ....D. Rimstead

Nelson Ducusin, Environment Ontario technician, checks the voltage on the constant flow control of one of the 51 high volume air samplers distributed throughout Toronto. The one shown is placed on the roof of a building at Wellington and Bathurst Streets in Downtown Toronto. (Photo: Tessa Buchan)

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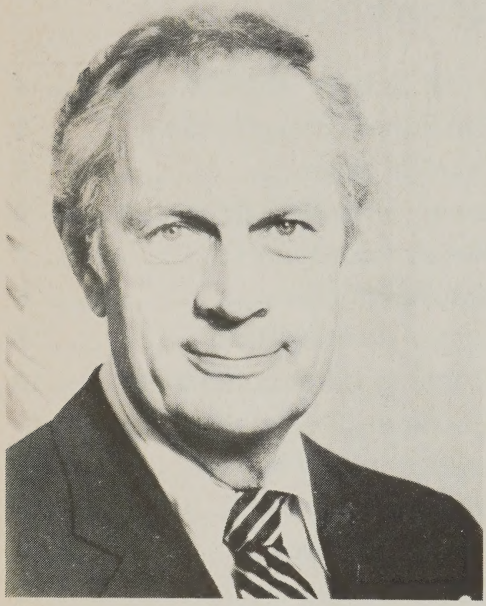
Allan E. Dyer, MD — Deputy Minister

Allan E. Dyer, MD, was appointed Deputy Minister of the Environment in August, 1984. Prior to his appointment, Dr. Dyer was Associate Deputy Minister responsible for institutional health, Ontario Ministry of Health.

During his 16 years' service with the Ministry of Health, Dr. Dyer was instrumental in developing and implementing many successful and well-known programs. Among them was the redesign of the funding system for hospitals, the start of major research initiatives to develop performance measurement and to improve the overall efficiency of the hospital system, the formation of the emergency health services division of the Ministry of Health, the implementation of the northern air ambulance program and the introduction of the first paramedic personnel in Ontario.



Allan E. Dyer

Dr. Dyer is a graduate of the Ontario College of Pharmacy. He also holds a Bachelor of Science degree from the University of Buffalo, and a PhD in Pharmacology and a Doctor of Medicine degree from the University of Toronto.

Dr. Dyer joined the Ontario Civil Service in 1968 as chief of drugs and biologicals and assumed responsibility for the program that led to the interchangeability of generic drugs with their brand name equivalents. In 1975 he was appointed director of the new drugs and therapeutics branch and in 1977 he became executive chairman of the Health Ministry's area planning co-ordinator teams.

In 1978 Dr. Dyer was appointed Assistant Deputy Minister, Institutional Health Services, and from 1981 he served as Associate Deputy Minister, Institutional Health. In this position he administered about half of the Health Ministry's budget.

Research studies conducted by Dr. Dyer led to the publication of one of the original papers on electro-shock defibrillation, a forerunner of the technique used in the resuscitation of victims of cardiac arrest.

Dr. Dyer, a former RCAF pilot, continues to fly as a hobby. His wife, Natalie, is also an MD and a practising anaesthesiologist.

Diane Rimstead, Director

Diane Rimstead

Ms. Diane Rimstead has been appointed Director, communications branch, Ministry of the Environment, in September 1984.

Before her appointment, Ms. Rimstead was assistant director, health promotion and information branch, Ministry of Health.

After taking a journalism course at the Ryerson Polytechnical Institute in Toronto, Ms. Rimstead embarked on a career which has encompassed journalism, advertising and public relations.

In her work with companies such as Eatons, Dominion Stores, IBM and Multiple Access Limited she has been involved in writing for magazines and newspapers, planning and writing advertising copy for exhibits, marketing brochures, posters and slide presentations, production and editing of annual reports and employee publications.

In 1978 she joined the Ministry of Health as assistant director, media and public information and was appointed in 1982 assistant director, health promotion of the health promotion and information branch.

31,000 children explore environment

In 1984 Environment Ontario's four Environmental Explorations program crews visited 413 locations — a 25 per cent increase over the previous year. Of the 369 locations visited by English-speaking crew members, 170 were schools, 130 were camps, and 69 were provincial parks. In addition, 35 French-language schools, five camps and five bilingual camps were also visited by bilingual crews.

At individual visits, crew members spent about two hours at each site discussing with pupils and teachers, campers and visitors of parks a wide variety of environmental issues, including the observation of nature, the problem of acid rain, the four Rs of waste management, the inter-relation of aquatic communities, and insect life cycles. With younger children the crews played environmental games designed to promote the understanding of the environment.

About 31,000 children and adults attended the presentations, with a total spin-off value estimated at 116,000 people.

The Environmental Exploration program is designed to introduce young people to the intricate interdependence of living things.

More water for Petrolia

Environment Minister Andy Brandt and Dave Hewlett, mayor of Petrolia, officially opened Petrolia's $1.25-million Bright's Grove water treatment expansion in a special ceremony in July. The expansion will serve the town's water needs more efficiently and supply water to the villages of Watford, Wyoming and Marthaville, as well as the townships of Plympton and Sarnia.

Of the $1.25-million cost of the expansion, $340,090 was provided by Environment Ontario.

The expansion consists of an adsorption clarifier and dual media filters each capable of handling one million gallons per day. Programmable controllers for chemical feeders, associated pumps and other electrical, electronic, and mechanical improvements were also part of the expansion.

The existing pumping station was built in 1896. The original project consisted of 11 miles of pipeline from Lake Huron to Petrolia, a steam pump, a standpipe, a pumphouse, 100 fire hydrants and a home for the engineer. At the time, it was the longest waterworks pipeline in Ontario.

The consulting engineer for the expansion was Robert L. App of Alvinston. Two local contractors, D.J. Whitlock and Mac-Tec Electric, performed the majority of the building construction and electrical work. Ray Jardine of the Petrolia P.U.C. was the general contractor.

New Sarnia district office

Environment Ontario's district office in Sarnia moved to new, larger quarters at 265 Front St. N. on August 1, 1984. The new location will provide better access for people of Sarnia and Lambton to Environment Ontario's protection services.

It will also provide the necessary space and facilities for the Detroit/St. Clair/St. Mary's Rivers Improvement Team.

This team, formed in May, 1984, is co-ordinating an assessment of environmental quality of the Detroit, St. Clair, and St. Mary's Rivers, as well as Lake St. Clair. The three-member team, headed by co-ordinator John Moore, will review technical data and reports on the rivers, evaluate general control programs for discharges and assess current monitoring programs.

Environmental mediation solves landfill problem

The first application of Ontario's new environmental mediation process has reached a successful conclusion with the agreement of 16 of the 17 participating groups.

The concept of environmental mediation was introduced in the Ontario Legislature last March in the Speech from the Throne. The Speech noted: "....In some cases, mediation may be a more sensible means of resolving disputes than existing administrative or judicial processes."

At issue in its first application was the choice of an acceptable interim disposal site for the domestic waste of six adjoining municipalities — Midland, Penetanguishene, Tiny Township, Tay Township, Port McNicoll and Victoria Harbour.

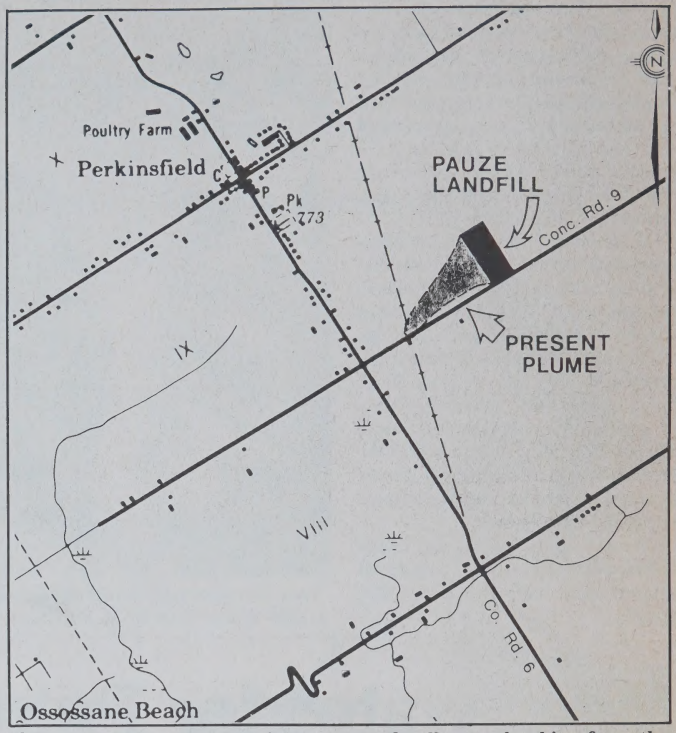
Five months of negotiations guided by a provincially appointed mediator produced a solution which won the unanimous approval of all parties. Mediation sessions were attended by individuals or deputations representing 14 different groups.

The six municipalities, banded together in the North Simcoe Waste Management Association, will continue to deposit their domestic waste in the Pauze landfill site near Midland for another three years. The site is specifically prohibited from accepting liquid industrial waste or hazardous solid industrial waste.

Mr. Brandt made the decision to seek environmental mediation on the Pauze site after discussing the matter on several occasions with area residents and their elected representatives.

He asked the Ontario Environmental Assessment Board to find a suitable mediator. It selected Michel Picher, lawyer, labor mediator and a former vice-chairman of the Ontario Labor Relations Board.

The Pauze site will continue to be monitored by Environment Ministry inspectors, and results of the monitoring will be shared with the parties to the agreement.



The map shows the shape of the plume of pollutants leaching from the Pauze Landfill site.

Hawkesbury plans waste management

Environment Ontario will provide a 50 per cent provincial grant to assist in developing a waste management master plan for the Town of Hawkesbury, the Town of Vankleek Hill, the Village of l'Original, the Township of West Hawkesbury and the Township of East Hawkesbury.

"A steering committee has been formed to retain a consultant and oversee the development of a master plan which will include extensive public participation," Environment Minister Andy Brandt said. "The committee consists of representatives from the participating municipalities and the ministry."

In accordance with the principles outlined in Ontario's Blueprint for Waste Management, this committee will co-ordinate long-range planning for waste management, including waste reduction, reuse, recycling, and recovery possibilities, in addition to landfill. The plan will be developed in three phases ... inventory of existing systems and facilities, analysis of options and development of a master plan, including an implementation plan.

"We are stressing full public consultation and participation in planning from the outset to minimize the confrontation which can develop and delay waste management proposals at the time of implementation," Mr. Brandt said. "In the long run, this will streamline the assessment and approvals process for future facilities when they are needed."

Even small children will grasp the basics of source separation fast.

$1.5 Million for recycling

Environment Ontario is providing an additional $525,000 for the support of source separation and waste recycling programs in the province.

The financial support reflects the ministry's commitment to the four Rs — reduction, reuse, recycling and recovery — as a principal system of waste management. The funds are intended to assist in the development of source separation of waste for recycling, which in turn will reduce the requirement for disposal sites and conserve energy and valuable resources.

Since inception of the program in 1981, the ministry has provided approximately $1.5 million to private and municipal source separation and waste recycling projects. The projects have a combined capacity to recycle almost 30,000 tons of waste per year, or the equivalent of all the garbage produced annually by a community of 76,000 — about the size of Guelph. The material recycled will save enough energy to heat 2,900 average homes for a year.

Of the total amount in additional grants, $475,000 has been committed for these projects:

Halton Region: An Environment Ontario grant of $123,000 will assist Halton Recycled Resources Inc. to extend its operation. Halton will become the only region in Ontario in which all municipalities are served by a multi-material recycling system. The company recycles newspapers, glass, metal, fine papers, cardboard and other materials.

Niagara Region: A $46,000 grant will help Niagara Recycling, a non-profit, employment training oriented organization, to continue its successful curbside collection and office paper program in the Niagara Region.

Richmond Hill: A $26,000 grant will assist Richmond Hill Recycling, a non-profit community based organization, to continue development of its recycling operation.

Durham Region: A $55,000 grant will allow Durham Recycling Centre to expand its collection system to the entire City of Oshawa.

East York: A grant of $69,000 will be used by the non-profit Conservation Centre in East York to expand its services to include apartment buildings and to improve promotion of its program.

Stratford: A grant of $23,000 will support Stratford Recycling's efforts to recycle newspapers and cardboard in the Stratford area.

Kitchener: A $101,000 grant will assist in improvement of Total Recycling Systems Ltd. multi-material collection services serving the City of Kitchener.

A $32,000 grant will assist J.C. Waste Management in the extension of its office paper recovery program across Ontario.

The remaining $50,000 is committed to the support of the promotion costs required by a number of smaller source separation and resource recovery projects.

Al Kuja, experimental biologist at the phytotoxic laboratory, explains the working of the new rain exclusion system to minister Andy Brandt.

Acid rain

Mobile canopies for study of crop damage

A $400,000 mobile rain exclusion canopy system opened in August by Ontario Environment Minister Andy Brandt will explore the effects of acid rain on Ontario's field crops.

Mr. Brandt activated the rain sensors of the innovative new system with a spray hose, setting the canopies in motion to cover 1,000 square yards of test crops. Every time it rains, these canopies roll into place and substitute carefully measured doses of acid rain for natural rain. "It's an innovative system that will help us get a better handle on how acid rain affects crops in Ontario by measuring the effects of known levels of acid rain," Mr. Brandt said.

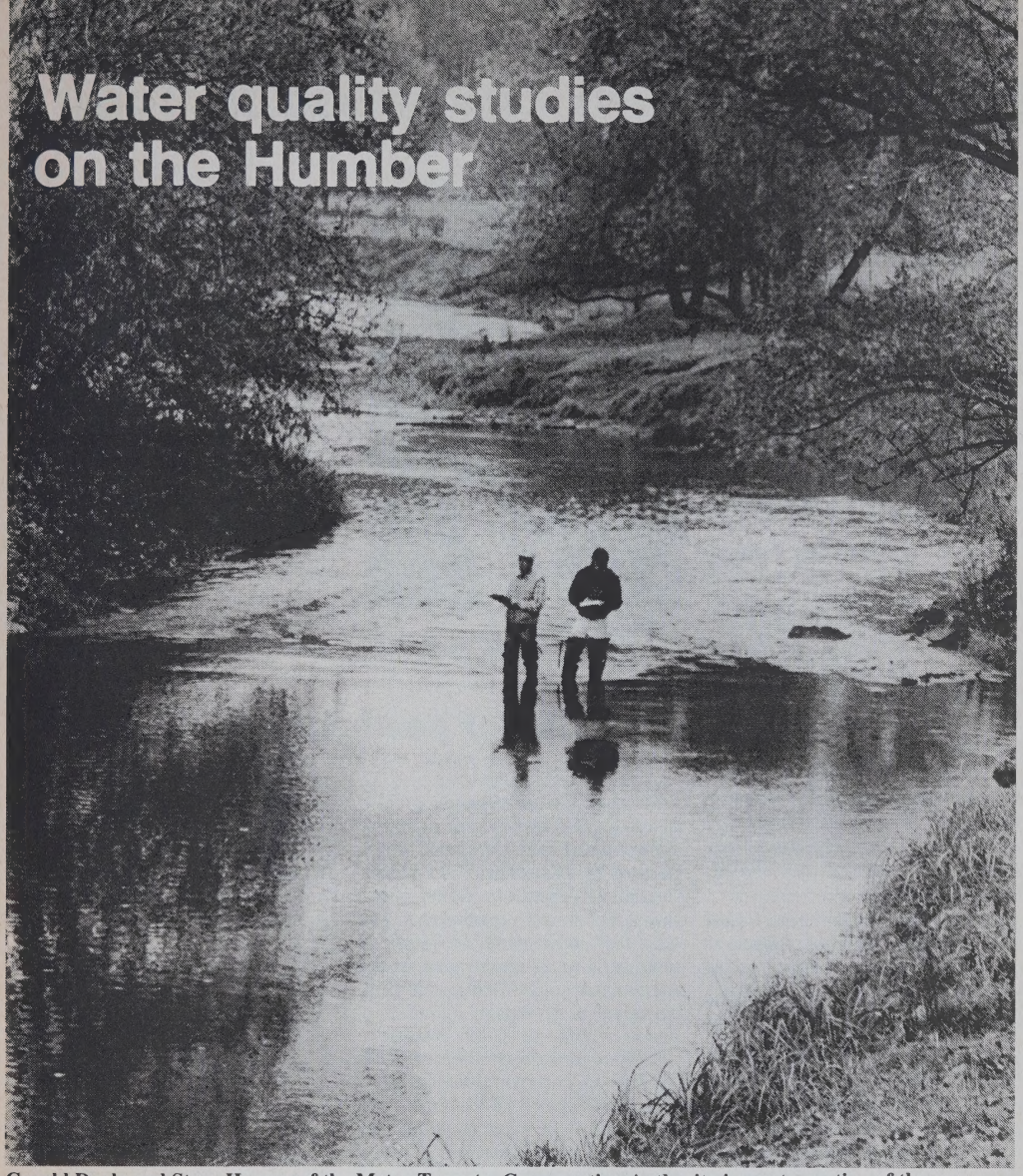
The system, located at the ministry's phytotoxicology laboratory in Brampton, is the first fully automated acid precipitation facility in North America and is part of the Acidic Precipitation in Ontario Study (APIOS).

By using carefully measured applications of pre-determined levels of simulated acid rain, ministry scientists can determine the impact of each of the various levels of acidity. The mobile rain exclusion canopy system features three large mobile canopies, 64 feet by 30 feet, each set on tracks 150 feet long, designed to exclude test crops from natural rainfall.

At present, crops of soya beans and radishes are being grown as test crops on more than 1,000 square yards of sandy loam representative of Peel region. The Brampton facility, combining the best features of systems currently operating in the United States, also has a blown-air system that protects the crops from dust particulates and other forms of airborne dry pollution when they are not covered by the canopies.

The system was developed by Environment Ontario's Air Resources Branch. Ontario Government Services engineers drew up the specifications and blueprints and the main contractor was George Brown Plumbing and Heating of Hamilton.

Water quality studies on the Humber



Gerald Doyle and Steve Harrop of the Metro Toronto Conservation Authority inspect a section of the upper Humber River for erosion. (Photo: Tessa Buchan)

Environment Ontario has provided a grant of $99,000 to the Metropolitan Toronto and Region Conservation Authority for water quality and pollution control studies in the upper Humber River watershed.

The studies will be carried out in the Humber River, north of Steeles Avenue, to determine the sources of bacteria, sediment, and other contaminants affecting river water quality in that area. Proposed work includes identifying and mapping areas of soil loss, point source discharges to the river, and other potential sources of contaminants.

The results of the study will be used in developing remedial measures to improve water quality in the upper Humber River before it enters Metro Toronto at Steeles Avenue.

"This proposed work will complement our continuing activities in the lower Humber River component of the Toronto Area Watershed Management Strategy Study. In addition, with the co-operation of the Ontario Ministry of Agriculture and Food, we will develop a valuable data base on rural and suburban activities in the upper Humber River basin," Environment Minister Andy Brandt said.

Drinking water committee formed

A new public interest liaison group which will play a significant role in key Ontario water quality issues was launched by Environment Minister Andy Brandt.

Mr. Brandt addressed the Public Interest Liaison Committee on drinking water issues at its inaugural meeting in St. Catharines.

"I believe the people of Ontario will be well served by this new body," Mr. Brandt said. "My ministry's programs and policies will benefit from the informed contributions of the capable people nominated to the committee."

The 11-member committee is chaired by J. Walter Giles, Associate Deputy Minister of the Environment.

Members nominated to date are:

— Grant Bagshaw, water and pollution control engineer, Regional Municipality of Niagara.

— Tom Davey, environmental science writer.

— Con Eidt, regional director of engineering, Regional Municipality of Niagara.

— Tom Fowle, representative, American Water Works Association, Ontario Section.

— Mrs. Margherita Howe, chairman of Operation Clean, Niagara.

— Dr. G.F. Mills, Medical Officer of Health, Niagara Regional Health Unit.

— Kai Millyard, researcher, Pollution Probe.

— Al Oleksuik, representative, Canadians for a Clean Environment.

— Ms. Toby Vigod, counsel, Canadian Environmental Law Association.

An additional member is to be nominated by the Ontario Medical Association.

Under its terms of reference, the new committee will:

— provide information and the opportunity for critical review of the Ontario Drinking Water Program, including aspects of policy (standard-setting and enforcement), research into sampling, analytical and water treatment techniques, surveillance (water treatment performance and distribution quality) and data assessment;

— serve as a forum for the exchange of information, ideas and views on emerging drinking water issues and on specific drinking water problems;

— provide an opportunity for the review of drinking water research, and for the discussion of Ontario research projects;

— identify areas for additional provincial effort in the areas of policy, surveillance and research;

— suggest appropriate means of communication to the public on drinking water issues.

J. Walter Giles

$276,000 for pesticide research

Twenty-eight grants totalling more than $276,000 for pesticide management related research have been awarded by Environment Ontario to Ontario universities, research companies and grower organizations.

Of the total amount, $108,000 is committed to integrated pest management studies, $40,000 to studies in biological pest control, $43,000 to studies of crop losses attributable to weeds, insects, and diseases, and $27,000 to improve structural pest control practices. The remaining $58,000 will be used to assess the persistence and environmental impact of several pesticides currently in use.

The University of Guelph has received a total of $131,000 in grants for 13 pest control research projects. Six pest management studies are under way at the University of Western Ontario for a total of $80,830 in grants.

Three forest pest management studies are supported: two totalling $8,200 at the Sault College of Applied Arts and Technology and one at the University of Toronto for $7,000.

Two research companies, Chemical Research International and Culice Inc., have received a total of $32,800 to finance four research projects, and the Ontario Apple Marketing Commission and the Ontario Vegetable Growers Marketing Board have been awarded $8,500 and $8,000, respectively.

All studies have been recommended and are administered by the ministry's Pesticides Advisory Committee. The results of the studies will be presented at the committee's annual symposium.

$10 million fine

An Illinois company, Waste Management Inc., agreed to pay $10 million in fines to settle allegations of mismanagement at a waste disposal site near Vickery in Ohio. The amount would be the second largest environmental penalty ever paid in the U.S., state officials said. By payment of the fine, the company will be allowed to continue operation of the Ohio liquid disposal facility in Sandusky County.

Ozone study in SW Ontario

"The majority of ozone that causes damages valued at $15-million yearly to Ontario crops comes from the U.S. The highest levels are registered in southwestern Ontario which is surrounded by the U.S.," says Dr. Sam Linzon, manager of Environment Ontario's phytotoxicology section — the unit that deals with the effect of pollutants on plants.

Ozone is formed by photochemical reactions involving nitrogen oxides and hydrocarbons. High levels of ozone have been found throughout southern Ontario. The Sarnia area itself is also a source of nitrogen oxides and hydrocarbons because of its heavy industrial activity.

$150,000 for air quality study

To clarify the situation, Environment Ontario has co-ordinated a $150,000 study of air quality in the Sarnia/Lambton area. The study has been designed to determine how much Sarnia emissions contribute to the oxidant problem in southern Ontario and to compare this contribution to contributions resulting from the long range transport of pollutants originating in the U.S. The results will also be used in the development of an ozone control strategy in Ontario.

"The ozone control strategy will determine air concentration effects and an inventory of all potential hydrocarbon sources," says Dr. Linzon.

In the Los Angeles area ozone is the main cause of smog. Oxidant damage to plants was first observed in the Los Angeles area in 1944. Recently phytotoxicology surveys conducted in southwestern Ontario have revealed widespread ozone injury to tobacco, tomato, potato and white bean crops.

"Ozone is a gas that is absorbed by the leaves through the stomata. It affects the metabolism to kill cells within the leaves," says Dr. Linzon.

Ozone causes damage to vegetation through spotting or bleaching of upper leaf surfaces. Susceptibility to ozone injury is influenced by environmental and plant factors. It is increased by high relative humidity and low carbohydrate content.

The age of the leaves is also a factor. The youngest leaves are resistant but become susceptible at the tips as they grow larger.

As the leaves mature, they also become increasingly susceptible to ozone damage at their middle and basal portions. Completely mature leaves become resistant again. Ozone-sensitive crops include bean, corn, onion, potato, radish, spinach, tobacco and tomato. Lettuce and endive are resistant.

"Farmers are concerned about the effects of ozone on their crops. The Sarnia study will help us better understand the source of ozone damage to crops in southern Ontario," says Environment Minister Andy Brandt.

Environment Ontario used three mobile air quality monitoring vehicles, including the TAGA 3000 (Trace Atmospheric Gas Analyzer) for the research study. They were stationed near Camlachie and Courtright. The mobile stations automatically record air quality with their self-contained computer and data acquisition systems. The computer system collects all data from the instruments and stores it on magnetic tape. This tape can be processed in the monitoring stations or at the air resources branch in Toronto.

mature leaves become resistant

A light aircraft equipped to monitor and track movement of pollutants assisted the study of air quality. The aircraft had stainless steel canisters which were filled over a period of 15-30 minutes with samples of air. Three to six samples, each of 1.6 litres, were collected daily.

Meteorology stations, along with existing Sarnia air monitoring stations, were also used. The units monitored wind speed and wind direction at 10 metres above ground, along with temperature, barometric pressure, humidity, and solar radiation. Pollution data from the Sarnia stations were sent by telephone to a computer.

The co-operative study, involving Environment Ontario's air resources branch, was assisted by the Lambton Industrial Society, U.S. Environmental Protection Agency and Environment Canada. Data collected from the study will be interpreted over the next several months and results of the ozone control strategy may be available in a detailed report within one year.

Less ozone

Release of chlorofluorocarbons at current rates could reduce stratospheric ozone by two to four per cent by late next century, reports the U.S. National Research Council. This estimate, based on improved mathematical models, is considerably lower than previous estimates.

99.999998% PCB destruction

A destruction and removal efficiency of 99.999998 per cent of PCBs is possible by the use of an advanced electric reactor, claims J.M. Huber Corporation of Texas. No emissions of hydrogen chloride, chlorine, volatile chlorinated hydrocarbons, dioxins or furans were observed at the stack and only trace amounts of particulate matter and oxides of nitrogen could be found. The reactor operates at temperatures of 4,000 to 5,000 degrees Fahrenheit.

Acid rain controls endorsed

Acid rain controls have been endorsed before a committee of the U.S. Senate by the American Public Power Association, the only national electric utility association in favor of immediate controls. The association believes that all mobile and stationary fossil fuel consumers should be taxed to pay for the controls.

Wabigoon River is recovering

Abatement programs undertaken by the owners of a pulp and paper mill at Dryden under the direction of Environment Ontario have virtually eliminated mercury discharges into the Wabigoon/English River system. High levels of organic materials have also been substantially reduced, states a technical report of the Canada/Ontario Steering Committee on the Wabigoon/English River System.

The 400-page technical report and 20-page summary has been filed with federal environment officials in Ottawa and with Environment Minister Andy Brandt and Natural Resources Minister Alan Pope at Queen's Park.

In the 1960s significant levels of mercury were detected in fish in the Wabigoon/English River system. The principal source of the mercury was traced to the chlor-alkali plant of the pulp and paper mill at Dryden.

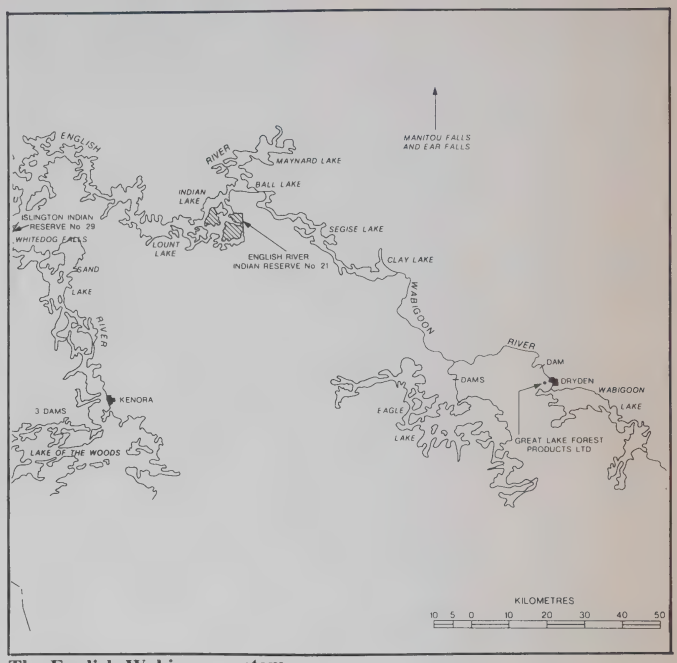
The report states that less than 50 per cent of the mercury released into the system now remains in the Wabigoon River. The remainder has entered Clay Lake, the first lake in the river system, or has been deposited further down the system.

The steering committee recommended that any remedial action take into account evidence that the system is recovering naturally from its historic contamination by mercury discharges. Data collected since 1978 indicate that the average mercury content in fish species such as walleye and pike in Clay Lake has declined by over 50 per cent. It is not yet known when the fish will be safe for unlimited consumption.

Scientists expect these improvements to continue.

In addition, the committee's report set out four principal recommendations for consideration by the federal and provincial governments:

1. Continue Ontario's mercury monitoring and fish consumption guideline program.
2. Test the effectiveness of the resuspension of clean clay from under mercury-contaminated sediments to accelerate natural burial of contaminated material and block mercury up-take by fish.
3. Dredge and remove mercury-contaminated sediment from the river between Dryden and Clay Lake.
4. Conduct two scientific studies on mercury loss to the atmosphere and on the effectiveness of selenium in reducing mercury bioaccumulation.



The English-Wabigoon system.

A key recommendation is the resuspension of clean clay over contaminated sediments to block the uptake of mercury by fish. Resuspension is a unique procedure arising from five years' intensive research by federal and provincial scientists. A small-scale experiment reduced mercury up-take in fish by as much as 90 per cent. The committee warns, however, that a large-scale project may not have the same degree of success.

The report also concludes that, although dredging of the river may be feasible, the extent to which it would accelerate the natural improvement of the system is unknown. Furthermore, disturbance and possible resuspension of mercury-contaminated sediment during dredging may cause further problems. The option recommending the resuspension of clean sediment leaves the contaminated sediments undisturbed.

A senior federal/provincial technical committee will be established to evaluate and recommend action on the steering committee's report. The evaluation will include proposals for the sharing of costs of future remedial work.

Copies of the report and summary, Mercury Pollution in the Wabigoon-English River System of Northwestern Ontario and Possible Remedial Measures, are available from Environment Canada offices in Ottawa and Toronto, the Toronto and Thunder Bay offices of the Ministries of the Environment and Natural Resources and the Kenora office of Natural Resources.

Emissions reduced in Hamilton

Hamilton air quality has shown marked improvements in 1983 over previous years, states a report recently released by Environment Ontario. Only on one occasion during the year did the Air Pollution Index (API) reach the advisory level of 32, compared with 13 times in 1982.

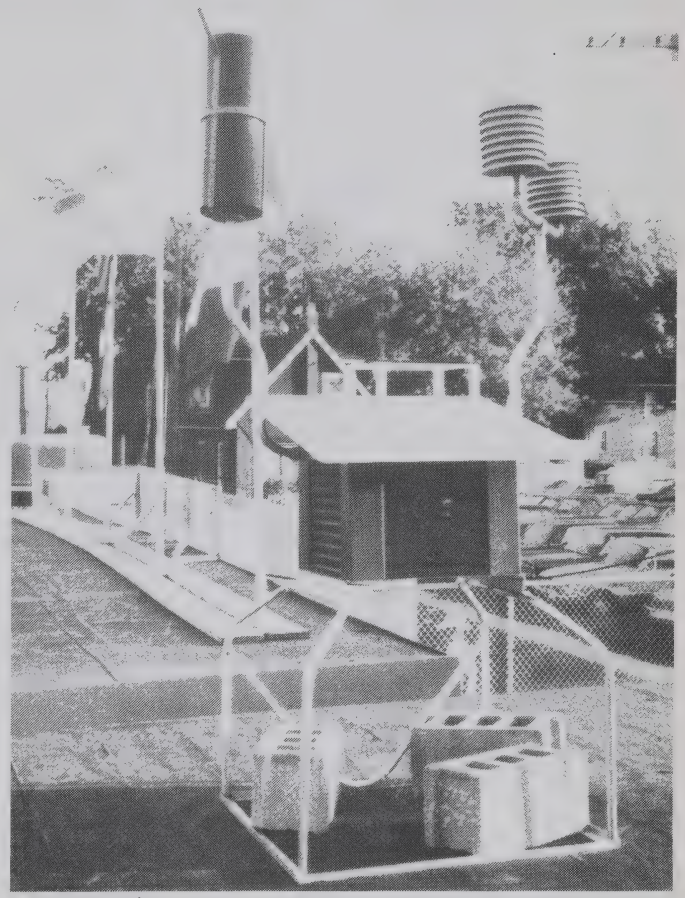
The improvement was due partly to favorable weather, specifically a reduction of severe inversion conditions which inhibit the rise and dispersion of pollutants emitted into the atmosphere and which frequently occur in the Hamilton area. There were also further industrial emission reductions due to lower production and improved pollution abatement at some emission sources.

The report states that the single incident of the API reaching 32 is in sharp contrast to previous years during which anywhere from five to 22 incidents have been recorded. The variation from year to year depends largely on the frequency of inversions, irrespective of changes in industrial emissions. The report notes that emissions in 1982 were also reduced, similar to 1983, due to reduced industrial production, yet there were 13 incidents on the API advisory scale that year, more than in recent years.

The study found that the improvement of air quality was most apparent on suspended particulate measurements at most of the monitoring stations. The effect on gaseous pollutants was not as significant, because most gaseous pollutants measured, such as sulphur dioxide and oxides of nitrogen, have been recorded at very low levels and well within ministry objectives for many years now.

Dustfall jars located throughout the city to measure heavy settleable dust showed no significant change from previous years and their readings remained well above objectives, particularly in the industrial area.

The report observes that dustfall levels throughout the city have remained virtually unchanged throughout the 1970s. This is considered surprising in view of the sizeable reductions in industrial process emissions and the correspondingly large reductions in suspended particulate concentrations. The report attributes fugitive dust sources such as uncontrolled stock piles, excavation and construction, vehicular emissions, road dust, and open lots susceptible to wind erosion, as major contributing factors.



This cluster of air monitoring instruments is similar to one placed in the centre of Hamilton.

Copies of Environment Ontario's Hamilton Air Quality Report from 1983 may be obtained from the ministry's West Central Region headquarters, (416) 521-7640, 12th floor, 119 King St. West, Hamilton L8N 3Z9 (P.O. Box 2112).

The quest for clean air

Of all the earth's features, the all encompassing mantle of air is the most vitally important one. Without it, most life as we know it — and certainly all human life — would cease within minutes.

It is not only the presence of air, but also its quality, that is of extreme importance to life, and it is this quality that has been under severe stress since the advent of the industrial revolution.

Up to about 20 years ago, the detection of life-threatening pollution in our air was at a fairly primitive stage. Black smoke or unbearable stenches were the only indicators used.

In Ontario, the situation changed in 1968 when the Ontario government assumed responsibility for the management and enhancement of air quality. Since then, industry in the province has spent more than $3 billion for air pollution abatement programs. Many of these programs were developed with the assistance of Environment Ontario, and the province's control process was constructively applied to set out specific environmental objectives.

To establish and manage these objectives, Environment Ontario has established a central laboratory that is now able to detect pollutants in the parts per quadrillion range — an ability that could be compared to the task of finding one pinch of salt in a mountain of 10 million tons of potato chips.

As part of its commitment to the best environment possible, the ministry has taken many innovative steps. Ontario was the first Canadian province to establish a special branch of government to deal exclusively with hazardous contaminants and the standards to be applied to their control.

At this time, the ministry's air resources branch is reviewing its program to determine the need for new policies, regulations and guidelines. The general air regulation, Regulation 308, is also under review.

Environment Ontario operates about 1,400 air quality and precipitation monitoring instruments across the province, which measure about 30 commonly known contaminants

standards for 160 contaminants

To set these standards, the ministry has developed a chemical assessment process which lays the foundation for the management and control of toxic substances in air. The research, its evaluation, the planning and the establishment of priorities have led to legislation and policies which have made the province a leader in the environmental field.

Point of impingement standards and desirable ambient air criteria have been established for more than 160 contaminants. Ontario air quality standards for several of these pollutants, including sulphur dioxide, ozone and suspended particulate matter are much more stringent than in other jurisdictions, including the United States.

routinely and a wide variety of other contaminants for special studies. A unique, highly mobile air monitoring unit, the TAGA 3000, provides instant, on the spot analysis of air quality and represents a breakthrough in the atmospheric analysis of contaminants.

This extends the capability of the ministry's three other sophisticated mobile monitoring units. In addition, each of the ministry's six regions is equipped with a mobile monitoring van to respond quickly to emergencies, and special equipment is being developed to sample for a variety of organic compounds.

An important aspect of Ontario's air management program is the Air Pollution Index (API). It has been es-

Larry Charbonneau, special survey technician at Environment Ontario's central region checks the air quality monitoring equipment placed on the roof of St. Luigi Secondary School in Toronto's Junction Triangle.

tablished to give warning of and to prevent adverse effects of air pollution build-ups. It gives the ministry the power to curtail the operations of major sources of pollutants when weather conditions indicate that pollutants may build up.

The API covers Toronto, Sarnia, Hamilton, Windsor, St. Catharines, Niagara Falls, Sudbury, and the nearby community of Coniston.

Since the inception of the API in 1970, the number of occasions on which the index has exceeded the advisory level of 32 has dropped in Toronto from as many as 19 to three times per year. In Windsor the number of times the API exceeded 32 has decreased during the same time from nine to one a year. In Sudbury the level of 32 was exceeded 26 times in 1971, and only twice since 1974.

new air quality index

By 1986, a new air quality index will be implemented. It will be based on six pollutants now continuously monitored. A new air quality telemetry system is being established that will allow the index to be made public in 20 cities across the province.

Since 1970 there have been dramatic improvements in the quality of the air in Ontario. The atmospheric levels of sulphur dioxide in downtown Toronto have been reduced 94 per cent, while carbon monoxide has decreased by 56 per cent. Also, suspended particulate levels have dropped 52 per cent in Toronto, and a 25 to 53 per cent reduction in atmospheric lead particles has occurred near lead industries in Toronto.

overall 48% reduction

In Hamilton suspended particulate matter has decreased by 21 to 58 per cent across the city, mainly as a result of the abatement of emissions by the steel industry. In Sudbury, sulphur dioxide has been reduced by 79 per cent.

Throughout Ontario, total suspended particulate matter decreased 48 per cent over the 1971-1982 period. During the same period, particulate lead, sulphur dioxide and carbon monoxide were reduced by 45, 84 and 57 per cent, respectively. Decreases of about 20 per cent have been found for ozone and nitrogen oxides from 1976 to 1982.

In 1969 Ontario became the first province to introduce standards for regular in-use control of automotive emissions. To ensure compliance with the legislation, an auto emission inspection program has been established.

A unique phytotoxicology section, staffed by plant pathologists, agricultural specialists, and greenhouse, laboratory and field technicians, investigates suspected air pollution injury to vegetation in forests, orchards, fields and ornamental plantings.

The ministry's phytotoxicologists can claim a number of achievements, including:

— World's first documented observation of arsenic injury on vegetation which was found to be caused by airborne arsenic emitted from gold smelters.

— Diagnosis of late spring leaf scorch of maple and beech trees showing symptoms resembling those caused by sulphur dioxide but diagnosed as caused by physiological conditions and adverse weather.

— First record of pine wilt disease symptoms occurring in Ontario.

— First record of the insect associated with beech bark disease in Ontario.

— Histopathological description of fluoride injury on Scots pine trees, which resulted in a diagnosis of a

Weather conditions are an important factor contributing to the accumulation of pollutants in the air of Ontario's industrial centres.

chemical discharge from a nearby oil refinery.

Assessment survey reports prepared by the phytotoxicology section on the degree and extent of vegetation damage in the vicinity of industries have been used by ministry staff to justify the control of emissions and to reduce or eliminate damage in the vicinity of industries.

The ministry is also concerned about vegetation damage due to acidic precipitation and photochemical oxidants. Ozone, one of the largest components of these oxidants, has caused extensive losses estimated at $20-million yearly to crops in southern Ontario. The damages are currently being used to guide the development of an oxidant abatement strategy.

extensive monitoring network

Studies associated with the ministry's acid rain and oxidant program have shown that a large contribution is due to that transported into the province from the U.S. and that international co-operation is needed to control this form of pollution.

Ontario has established an extensive acid deposition monitoring network. It has also developed mathematical models to determine the emission sources that contribute to the acidity of the rain.

While pressing the United States administration for a reduction of U.S. emissions to within the limits established by U.S. laws, Ontario has continued its efforts to put its own house in order.

Emissions at the province's largest single point source of sulphur dioxide, Inco Limited in Sudbury, have been reduced by 64 per cent from 2.0 million tons in 1969 to 728,000 tons in 1983. Ontario Hydro is required to reduce its emissions from the current 438,000 metric tons to 390,000 tons by 1985 and 260,000 tons by 1990.

Ontario, the federal government and the governments of the eastern provinces have recently decided to make further efforts within their own jurisdictions. They have committed themselves to a reduction of emissions by 50 per cent of the 1980 level. The means by which this can be done are being worked out.

The phytotoxicology section concentrates on the study of the effects of pollutants on vegetation, especialy on crops.

Another undertaking of the highest priority is a revision of Regulation 308 under The Environmental Protection Act. This regulation is now being reviewed by seven working groups within the ministry.

Under review are:

— the air pollution index

— the calculation of point of impingement concentrations

— the methods of controlling long-range transport of air pollution and chemical deposits

— the specifications of contaminant levels for vegetation and soil

— methods for measuring smoke density and opacity and the control of combustion sources.

Since 1974, when this regulation was last reviewed, the technologies of air pollution monitoring and control have made great strides, and everybody involved, including the academic and scientific communities, industry, and environmental organizations, are making valuable contributions to the review of the regulation.

Acid rain threatens sugar

Maple dieback, a syndrome of growing concern to maple syrup producers, involves the decline, dieback, deterioration and ultimate death of large numbers of Ontario's sugar maple trees.

In the spring of 1984, a number of Huntsville/Parry Sound area maple syrup producers complained to the province about the possible relationship between the health of their sugar maple trees and acid rain. An investigation team was assembled by the phytotoxicology section of Environment Ontario under the leadership of Dr. Sam Linzon, to examine the cause of this problem. The team of eight includes a forest scientist, a soil specialist, a pathologist, lab technicians and students who visited affected Ontario sugar maple woodlots in June, July and September of 1984.

dieback not new

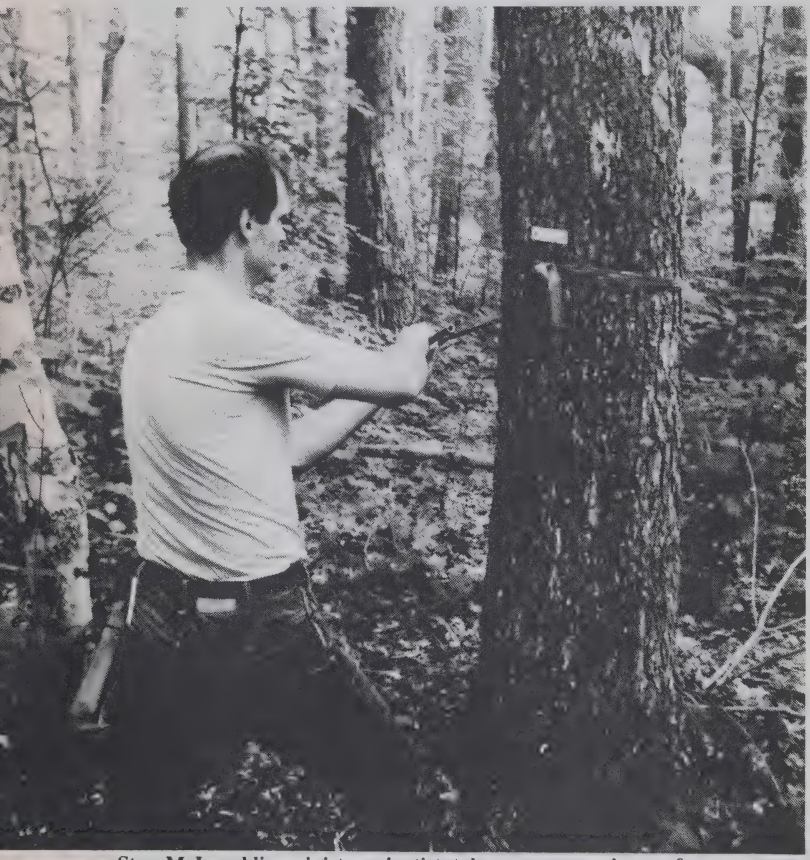
Maple dieback is not a new phenomenon. It was first reported in Ontario in 1952 and to better understand it one must realize that sugar maple is a unique tree species. It does not easily adapt to urbanization and its shallow root system make it susceptible to many stresses. Such factors as roots covered by pavement, excavations, winter salt splashed onto roadside trees, and salt runoff along roads result in branch dieback due to stress. Branch dieback often reflects the amount of damage or death in the root system, as the roots and foliage work together to nourish the tree.

The roots take up a sufficient amount of water and nutrients, and the leaves react metabolically to manufacture carbohydrates and proteins, which are then transported to the roots. Damage to the roots starves the foliage and decreases the food supply for the roots, thereby intensifying the problem. Root rot occurs on stressed trees and branch dieback progresses down the tree.

Dr. Linzon feels it is important to determine the cause of maple dieback. There are two schools of thought in explaining the causes. Some scientists believe that acid rain is the sole factor responsible for maple dieback. Other scientists believe acid rain is involved along with other natural elements.

"Acid rain is definitely involved. Maple dieback is what I call a syndrome. It is complex and site-specific. The cause of decline of one tree may be different from another tree in the same area. It is easy for someone to see a dying tree and say — yes, it is acid rain, but that is just too simple," said Dr. Linzon.

"Acid rain will not be the single factor involved in the decline of all the trees. It may be involved somewhat in all trees, either in a primary or secondary manner. It may trigger the de-



Stew McLaughlin, ministry scientist, takes a core sample out of a sugar maple. The tree rings on the sample are good indicators of the history and the health of the tree.

naples

cline or aggravate a stress caused by other factors,'' said Dr. Linzon.

The role acid rain plays in maple dieback will hopefully be determined in the Huntsville/Parry Sound study through analyses of woodlot samples and a thorough historical overview of the plots tested. Through this process, the role of acid rain and other natural factors will be accurately assessed. Results of the study are expected to become available in early 1985.

a complex syndrome

Other aspects of maple decline will be examined in the study. Photographs will be taken of selected trees during each visit. Foliage and roots will be chemically analysed in the phytotoxicology lab of Toronto for calcium, magnesium, potassium, aluminum, lead, cadmium, boron, chloride and starch contents. Soil will be analysed for pH, base saturation and texture. Radial growth increment cores will be removed and examined. Trees will be examined for the presence of disease or insect manifestations. Sugar maple regeneration will also be recorded.

There is important reasoning behind the team's visits to selected woodlots under study. Their first visit was in early June. Since trees had then just put out their foliage, forest canopies should have looked green and healthy, except for the presence of dead branches. At the end of July, Dr. Linzon and his team looked for foliage discoloration — leaves changing color before they should. This is the first sign of branch dieback. In the third week of September, healthy trees should still have green leaves. Affected trees will show signs of premature discoloration.

A questionnaire was also given to sugar maple producers to determine background and ecological information, including sap production, in the selected woodlots.

''Producers don't see any decline in maple syrup production at present and most didn't mention any problems with sugar content and flavor. But they are worried about the potential for decreased production as a result of tree decline,'' said Dr. Linzon.

One out of every 10 Canadian jobs depends on our forests, and Canadian forestry products are valued at more than $20 billion yearly. Although damage to forests has been evident for some time in Ontario, no firm evidence exists to prove that this damage is caused by acid rain.

Mike Harris, M.P.P. for Nipissing, is concerned about the damage acid rain may cause to Ontario's forest. ''Environment Ontario realizes the importance of sugar maple and of timber to the economy of Northern Ontario, and will investigate this problem very thoroughly,'' Mr. Harris said.

produces involved

More important than production, says Dr. Linzon, is the threat of a forest catastrophy. ''We have heard about forest catastrophies occurring in the U.S. with red spruce dieback and in Europe with the European beech and Norway spruce trees. The closest we have to this is maple dieback in both Ontario and Quebec,'' said Dr. Linzon.

To be able to monitor for such widespread damage, Dr. Linzon and his team have encouraged the Canada Forestry Service of the Canadian Department of the Environment to implement an Early Warning Monitoring System in 1985. This system will be based on a similar project currently going on in Germany. The Canadian Forestry Service will establish about 75 plots to various tree species across Canada to look for any early warning systems or unexplained injuries which could be attributed to acid rain.

''There is no forest that will ever be 100 per cent healthy anywhere in the world. But there is a substantial amount of dieback in our maple trees, and we are determined to find out why,'' said Dr. Linzon.

Special corers are used to take soil samples.

Acid rain

Two networks keep watch

Since the fall of 1980 Environment Ontario's Air Resources Branch has been operating two networks designed to determine the quantity of wet and dry deposition of airborne pollutants on Ontario. Both networks are operated under the auspices of the Acidic Precipitation in Ontario Study (APIOS).

One of the networks, the APIOS Cumulative Wet/Dry Deposition Network, collects samples on a 28-day cycle for the determination of long term wet and dry deposition patterns. The other, the APIOS Event Wet/Dry Deposition Network, collects wet precipitation and air filter samples daily.

The daily collection of wet deposition samples allows the study of the chemical composition, frequency and intensity of acidic precipitation events, and the determination of the origin of pollutants.

The daily dry deposition network permits ministry scientists to determine the air concentration and dry deposition of airborne acid-related pollutants and to associate these observations with air masses originating from different source areas.

Four general areas of Ontario, namely London, Kingston, Dorset and Atikokan were chosen for the sampling program. In the London, Kingston and Atikokan areas, located close to the U.S./Canada border, samples can be used to estimate the relative amount of deposition originating in the U.S. and Canada. Atikokan was also chosen to monitor the background concentration of pollutants before the start-up of the coal fired generating station in Atikokan. In this area also lie the acid-sensitive lakes of the Boundary Waters Canoe Area of northern Minnesota. Dorset was of particular interest because of the sensitivity of the local lakes to acidification, and the aquatic and terrestrial effects studies being carried out there by the Ministry of the Environment.

Each of the four areas has four event precipitation collection sites except Atikokan, which has been recently reduced to three. The four samplers within each cluster are typically separated into two groups placed at about 50 to 100 km distance from each other. Within each group, the samplers are generally five to 10 kilometers apart. At one station in each of the four areas, the daily air concentration of selected pollutants is also measured to infer dry deposition.

Sampling sites are located away from local sources of pollution, such as industries, urban areas, airports, highways, etc. The instruments themselves are placed at sites clear of obstructions (trees, buildings), away from roads, sewage treatment plants, farms, gravel pits, salt or sand piles or gardens.

daily sample collection

Sites that would satisfy all such strict requirements were often difficult to find, and the distance separating samplers had to be extended in some cases, especially in sparsely populated northwestern Ontario.

Precipitation is collected for chemical analysis in special samplers with moisture sensors. A lid covers the samplers, but is removed at the onset of precipitation. Instruments that measure the amounts of rain or snow are also present on the site to allow exact measurement of precipitation.

Operators check the wet deposition samplers daily, collect the samples, record and refrigerate them. Samples are later transported in coolers to the regional laboratories or by courier to the main laboratory in Toronto. Here they are analyzed for their pH, total acidity and for the presence of sulphur and nitrogen compounds, chloride, sodium, potassium, calcium, magnesium and conductivity.

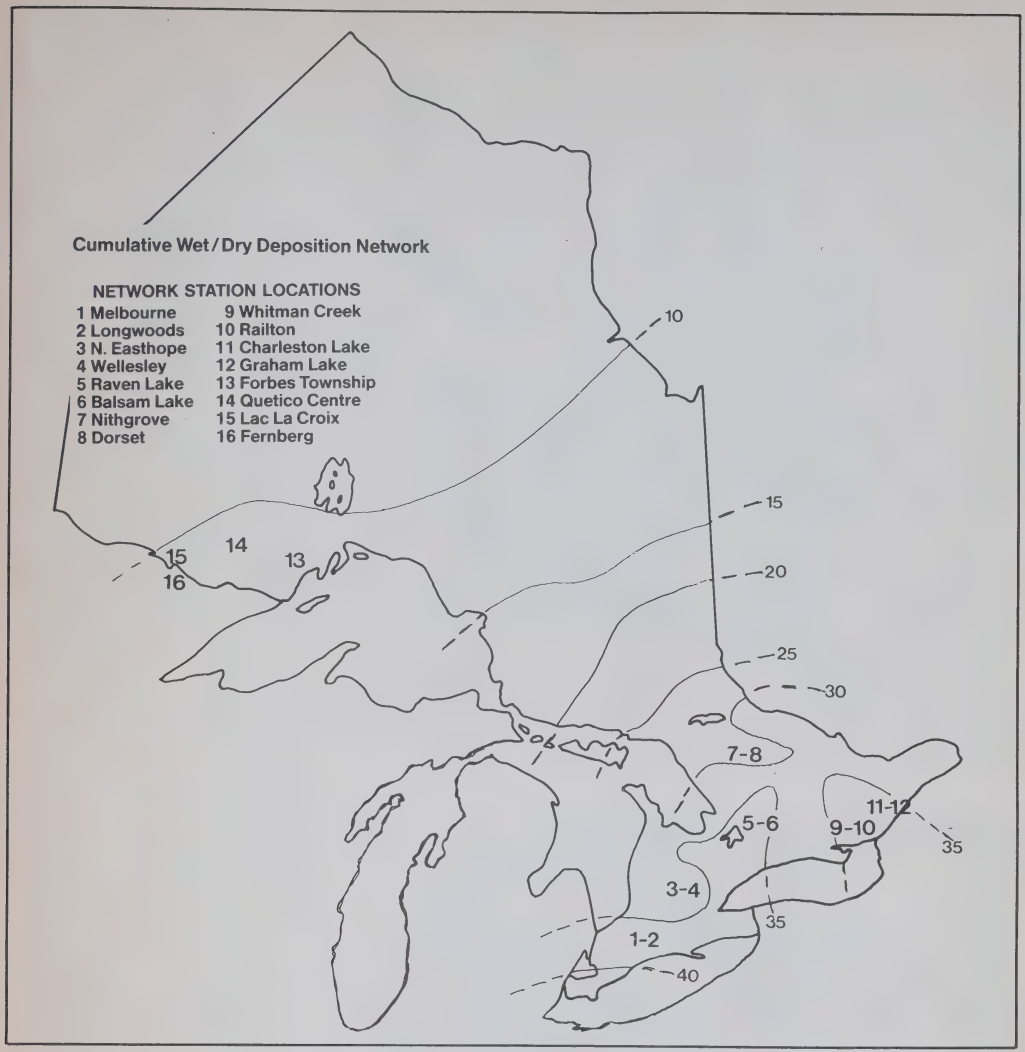
The instrumentation placed at the daily sampling sites for determination of dry depositions consists generally of air filter packs placed on top of 10 m towers. Each instrument consists of nine filter packs, a flow controller and a timer. Seven of the filters are consecutively switched on for each day of the week. The eighth filter pack is a spare used if the collection cannot be made on the seventh day. The ninth filter remains passive to allow a correction for background concentrations.

Each filter pack has three separate sections — one for the collection of particulates of sulphates, nitrates and ammonium, the second one for the absorption of nitric acid and the third for the absorption of sulphur dioxide.

After collection, the filters are bagged and labelled at the regional laboratories and sent to the ministry's main laboratory for analysis.

The information gained is entered into the ministry's Sample Information System data base. The data can be retrieved at any time for the calculation of daily wet and dry deposition rates as the product of pollutant precipitation concentration and precipitation depth, and as the product of pollutant air concentration and deposition velocity respectively for the characterization of events and for the correlation of deposition data with air parcel trajectories for the determination of the origin of the pollutants.

For the cumulative wet/dry deposition network, 36 sites have been chosen for automated precipitation samplers. Low-volume air samplers are located at 23 of these sites. The sites have been selected following basically the same criteria used for the



The map shows the location the stations of Environment Ontario's cumulative wet/dry deposition network and, as an example of the results obtained from depostion monitoring, the annual wet deposition levels of sulphates in Ontario, given in kg per hectare of SO_4 in 1981. The iso-line of 20 kg per hectare per year indicates the area, in which this level has been registered. 20kg/ha/year is considered by many scientists to be the limit of sulphate deposition, above which sensitive bodies of water may be affected. The iso-lines also show that, in 1981, the threshold value of 20kg/ha/year was exceeded in all of central and southern Ontario. The dry deposition rates of sulphur and nitrogen compounds show similar levels.

selection of the event deposition sampling stations.

Because variations in the amount of deposition are larger in southern Ontario, most of the samplers have been placed there.

The objectives of the cumulative wet deposition network are to allow the study of the chemical composition of precipitation within the province and to allow the determination of the long-term wet deposition of various chemicals across the province.

The objectives of the cumulative dry deposition network are to determine the ambient concentrations of airborne acid-related pollutants as well as the long term dry deposition of various chemicals across the province.

Each cumulative wet deposition site is equipped with an automated deposition collector and a standard precipitation storage gauge. At the dry

Instrumentation used in APIOS cumulative wet deposition monitoring.

Instrumentation used in cumulative dry deposition monitoring.

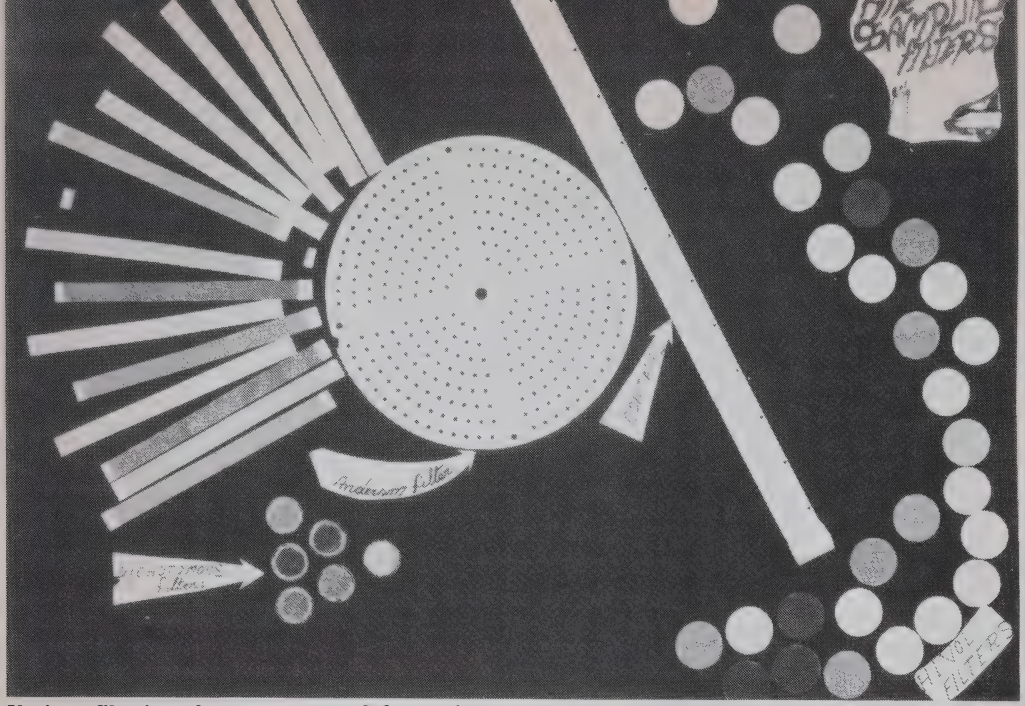
deposition sites, low-volume sampling packs with air filters are used to estimate dry deposition. The filtration system is equipped with a heavy duty diaphragm pump in which the flow rate is controlled, a temperature compensated dry gas meter to allow accurate monitoring of the air flow and digital counters to record the total volume of the sample and the time of operation. The two stage polypropylene filter pack is mounted at a height of two meters.

The wet deposition samples are collected every 28 days on Tuesdays. The operator removes the sample, cleans the instrument, places a new sample bag into the sampler, checks performance of the instrument, measures the storage gauge and records the observations. The filter packs of the dry deposition samplers are collected at the same time, and replaced by new ones. The digital counters on the sampler are reset to zero and the instrument is switched on to resume operations.

multielemental analysis

The wet deposition samples are sent to the ministry's laboratory and analyzed for volume, conductivity, pH, total acidity, SO_4, $N\text{-}NO_3$, $N\text{-}NH_3$, chlorine, calcium, magnesium, sodium, potassium, total Kjeldahl nitrogen, total phosphorus, zinc, iron, nickel, copper, lead, aluminum, cadmium, manganese and vanadium. The dry deposition samples are analyzed for essentially the same elements and compounds as the wet deposition filters.

The data gained by analysis are entered into the ministry's Sample Information System data base. Analysis of the data gained involves the calculation of cumulative wet deposition rates as the product of pollutant precipitation concentration times the true precipitation depth. Reports of cumulative concentration and deposition data listing and annual statistics are published regularly. The data gained by the analysis of dry deposition are also entered into the data base and processed and published in reports similar to the wet-data reports.



Various filtering elements are used for various purposes. The thin strips on the left of the photo are glass fibre filters, the small round filters below are dichotomous filters used to trap particles of different sizes. The large filter in the centre of the photo is an Anderson filter, which allows the separation of particles by size. The long thin strip is a piece of COH-tape used to measure the coefficient of haze. The small round filters on the right of the photo are high volume glass fibre filters that allow a fast analysis of the material trapped in them. Various shades of grey indicate the amount of particulates collected during the filtering period.

200 stations monitor air

Ambient air is regularly sampled for suspended particulate matter at about 200 stations in Ontario. These samples are transmitted for analysis to Environment Ontario's Air Quality Unit of the main laboratory.

Dr. Brian Foster is in charge of the unit's analysis section. He believes that the processes of determining the pollutants suspended in the air and their sources is similar to detective work.

Ambient air contains very fine particles of a wide variety of materials. Some of them are natural products, such as pollen from flowers, dust from volcanic action, etc., while others are generated by human activity. Most pollutants are of complex and variable composition. They may consist of metals, such as lead, cadmium, copper, arsenic, iron and nickel associated with inorganic anions such as sulphates, nitrates and fluorides or organic compounds.

Excessive levels of some of the materials in ambient air may cause health problems and damage to vegetation and buildings. It's Dr. Brian Foster's crew's job to determine the nature of these particulates and their level.

filters changed daily

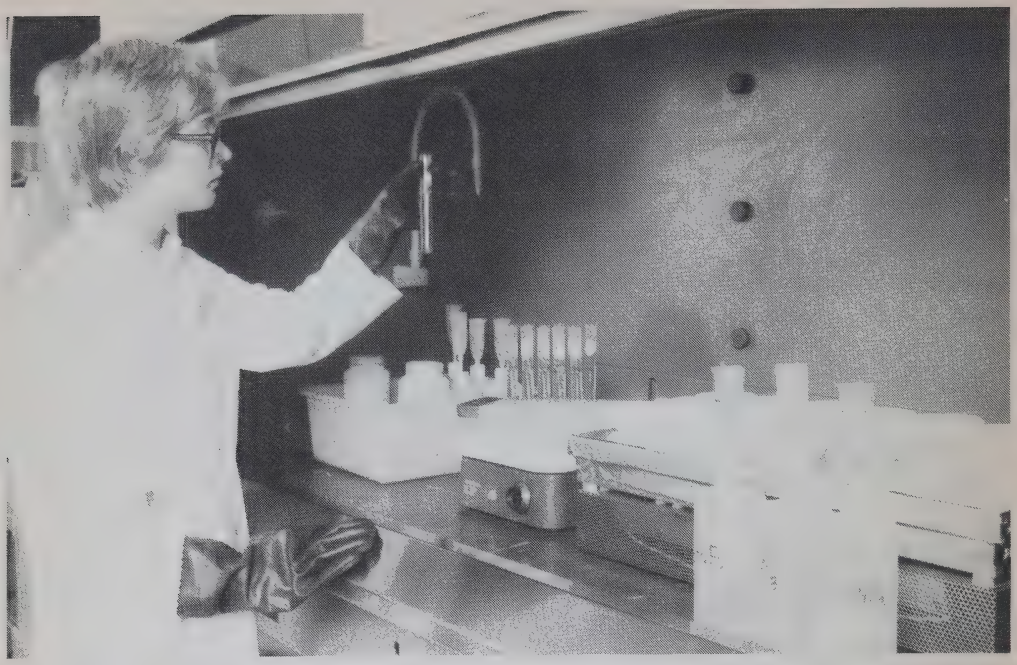
For such analysis, particulate matter suspended in air is collected by high-volume air sampling equipment. In this equipment air is drawn by vacuum through a tared glass fibre filter. The exposed filter is conditioned at 50 per cent humidity and reweighed. The tare is subtracted from this weight to determine how much suspended matter the filter has collected. The result is reported in $\mu g/m^3$ and can range from 10 to 200 $\mu g/m^3$ depending on the location.

The 20.3 x 25.4 cm (8'' x 10'') glass fibre filters are exposed on a 3 to 6 day cycle depending on the area. In some industrial areas, such as Toronto and Hamilton, they are changed daily.

On arrival at the ministry's Toronto laboratory the samples are entered on the Laboratory Information Service (LIS) which requires the following information:

— the filter number
— station number
— date of exposure
— volume of air passing through the filter
— client

The filter is then weighed and the total suspended particulate (TSP) recorded and then sampled. A 2 x 25 cm



Student Diane Becker dissolves glass fibre filters in an acidic solution to allow a reliable analysis for pollutants.

(3/4 x 10 inches) strip is cut from the filter. It is ashed in a furnace at 500°C to remove all interfering organics. The ashed material is placed in a Teflon dish on a hotplate set at 90°C. The filter strip is completely broken using a Teflon rod. The glass fibre is dissolved completely with an acidic solution (one part hydrofluoric acid plus one part nitric acid plus one part water) and dried. The residue is then redissolved in a solution of five per cent nitric acid.

Along with the sample, a sample whose metal concentration is known, is analysed as a quality control check. The values obtained will confirm unusual findings or contamination before and after collection, if necessary.

The solutions are then analysed. "You have to do as many tests as there are contaminants to be checked out," said Dr. Foster. For final analysis, the air quality unit uses one of two methods: atomic absorption spectroscopy (AAS) or inductively coupled plasma emission spectroscopy (ICP).

In the former analysis, the acid digested sample is atomised in an air/acetylene flame. Light of a specific wavelength generated by a hollow cathode tube is transmitted through the sample, and a portion of the beam is absorbed by the element of interest. The percentage of the absorption is compared to that of known standards, and from that the true concentration is obtained.

The AAS unit is fully automated. To analyze 50 samples, standards and Q.C.'s for six elements takes 50 minutes. The raw data are stored on discs and used to calculate the metal level in $\mu g/m^3$. The Q.C. data are updated and checked daily.

Where a metal scan of some 12 elements is required, inductively coupled plasma spectoscopy (ICP) can be used. When the liquid sample

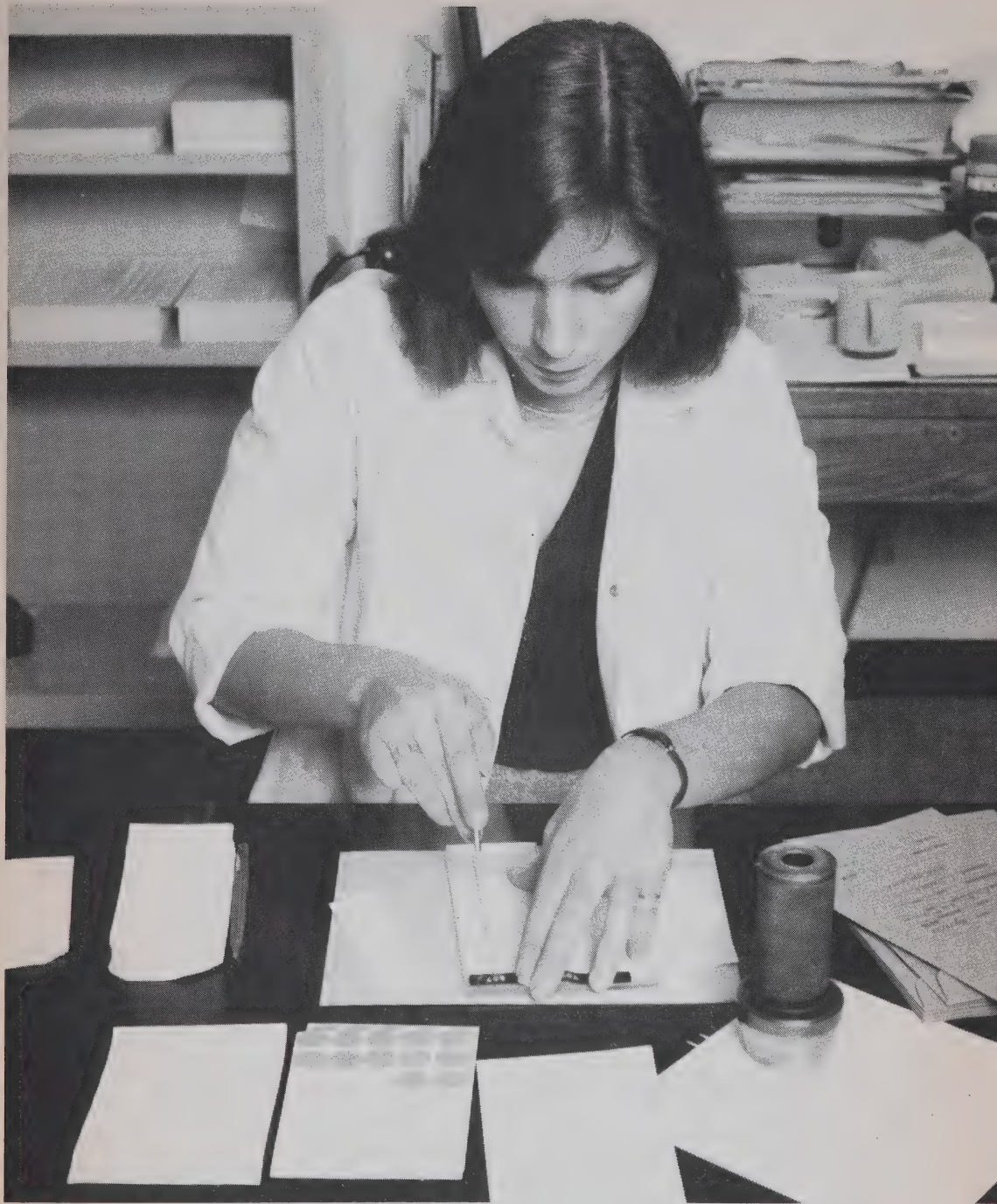
analysis fully automated

is heated to a high temperature (8000°C) the metal constituents become atomized. Some electrons of each atom shift to a higher energy level, the so-called excited level. When they return to their normal or stable lower level, energy is released. Each release is characteristic of one element and is detected by its spectrum. The spectrum is detected using calibrated photoelectric cells giving the composition of the sample. Up to 20 elements can be determined simultaneously.

The results are computerized, entered on the LIS, and a report concerning each sample is sent to the client responsible for that station. The reports give all relevant collection data, plus each type of element found and its quantity.

An average of 70 samples arrive daily at the unit. This may sound strange since there are 200 stations, but the operating cycle governs the number of samples generated.

The results obtained are considered to represent the level of each pollutant at the point of impingement. If unusually high levels or unusual toxic materials are found in the air, Environment Ontario investigators can use the results as clues to locate the source of the pollutants, to check their level at the source of emission and lay the groundwork for an effective control.



At the laboratory technician Vivian Hatgionnou cuts the filters collected from the high-volume air sampling instruments into two cm wide strips for further processing.

In the construction of the Innisfill sewage collection system, the contractor used a new method in which excavated material is immediately conveyed back to fill the ditch after the pipes have been placed.

Cooperative strategy for Lake Simcoe

Lake Simcoe, sometimes called the sixth Great Lake, has two very attractive features:

Its warm water and sandy beaches lie within less than an hour's drive for half of the province's population and it is one of the most, if not the most, intensively fished bodies of water in Ontario, after the Great Lakes. Anglers spend more than one million hours every year in their boats or in fishing huts on ice in their efforts to catch fish living in this lake.

To the environmentally minded Ontarian, Lake Simcoe is of special interest for another reason: the first regulations formulated to protect Ontario's aquatic environment were designed to protect Lake Simcoe fish and were adopted in the 1880s.

first environmental regulations

At that time, lumbering was the main industry in the area, and the numerous and very productive mills along the shore of this lake produced — aside from a respectable amount of lumber — an impressive amount of sawdust, which was promptly discharged into the lake.

This sawdust ended up on the lake bottom where it decayed, consuming oxygen needed by fish.

The ban on sawdust discharges and its enforcement seem to have been quite successful; commercial fishing continued on Lake Simcoe well into the Thirties.

In the first quarter of this century, however, the fish of the lake began to feel another stress — that of the growing permanent and seasonal population along its shores, and of a more intensive agricultural use of its drainage area. The main pollutant at

this time, and the main pollutant still threatening the quality of the water today, is the excessive load of phosphorus to the lake.

This phosphorus reaches the lake from a variety of sources. The principal ones are discharges from sewage treatment plants, malfunctioning and obsolete septic tank systems, urban runoff, nutrient enriched runoff, and top-soil erosion from agricultural lands.

In 1975 concern about the decline of the cold-water fish population, as reflected by municipalities along the lake, their permanent and cottage residents, the South Lake Simcoe Conservation Authority, and the Ministries of Natural Resources and the Environment, led to the formation of the Lakes Simcoe-Couchiching Report Committee.

phosphorus reduction well on its way

Directed by the Cabinet Committee on Resources Development, this report committee assessed the environmental problems and proposed a strategy to deal with them. These determinations led to the decision of the Ontario government that phosphorus input into the lake must be reduced.

Today the lake is well on its way to achieving this reduction. Environment Ontario's program to restore the quality of Lake Simcoe water to a state that would allow the natural reproduction of all species of cold-water fish has five main thrusts:

— Following completion of a $23-million extension of the York-Durham project, sewage from Aurora and Newmarket is being redirected to the York-Durham sewage system for treatment at the Duffin Creek plant.

— The phosphorus level in effluents from the existing sewage treatment plants in Barrie, Orillia, and Bradford will be reduced by two thirds, from 1.0 milligrams per litre to 0.3 mg/L. This is a higher standard than the one applied to equivalent sewage treatment plants on the shores of the lower Great Lakes. This work is completed at Bradford; it is nearing completion in Orillia and it has started in Barrie.

— In Keswick, a $53.6-million sewage and water treatment project is nearing completion. This sewage treatment system will replace malfunctioning private septic systems and provide capacity for additional growth. It will, by limiting the phosphorus level in its effluent

$80.6 million in two projects

to 0.3 mg/l, minimize its impact on Cook Bay and improve local ground and surface waters.

— The same effluent criteria also apply to the $27-million sewage treatment project in Innisfill.

— The Lake Simcoe Environmental Management Strategy Study initiated in 1981 is looking at all phosphorus discharges to the lake and investigating methods for the reduction of all diffuse or non-point sources. It is also establishing baseline conditions. This will allow the ministry to determine the effect of phosphorus abatement programs in the future.

This study team will report to the Management Steering Committee and to the Minister of the Environment, and will present recommendations for further basin and lake improvements.

land owners also involved

The Ontario Ministry of the Environment, in co-operation with the Ministry of Agriculture and the South Lake Simcoe Conservation Authority, will provide information and assistance to land owners with respect to erosion control and optimum fertilizer applications.

Such management efforts will help the farmer to retain valuable productive soils, to improve the immediate environment, and to contribute to the betterment of water quality in the basin.

The completion of these projects in the next two years will place a tight control on all major phosphorus loadings to the lake originating from sewage treatment plant effluent. It will, however, not reduce the ministry's commitment to further improvements from all controllable sources.

The Lake Simcoe Environmental Management Strategy Study has been extended for an additional year. Up to now, these studies have looked at the overall phosphorus loadings to the lake, and the relative size and the significance of a variety of point and diffuse sources.

The study team is now developing remedial measures to reduce the loading from urban drainage and agricultural lands in the basin. Its findings will lead to cost-effective remedial management options and recommendations in the foreseeable future.

The results of the study will also provide input for specific develop-

to protect fish habitats

ment criteria to ensure the protection of the nearshore fish habitat and the continuation of Lake Simcoe as a vital provincial sport-fishery.

The projects and measures recently completed, or now well under way, will give a good reason to expect a noticeable improvement in Lake Simcoe water quality.

There is another reason to be optimistic about the quality of Lake Simcoe water: the excellent spirit of co-operation existing among all of the parties concerned — the municipalities along the shores of this beautiful lake, the South Lake Simcoe Conservation Authority, the Ministries of Natural Resources, Agriculture and Food, and Environment Ontario.

Grant for pest management

Environment Minister Andy Brandt has awarded a Guelph research company, Culice Incorporated, $14,500 to study the feasibility and economics of the development, implementation and maintenance of an integrated pest management program for potatoes in Ontario.

The study was recommended and will be administered by the Ontario Pesticides Advisory Committee. The results will be presented at the committee's annual research symposium.

Hazardous contaminants

In search of a realistic balance

assessment of potential hazards

Two years ago, Environment Ontario established a hazardous contaminants and standards branch (HCSB), the first such office in Canada. Why did the ministry do this? What are hazardous contaminants? And what are standards?

Glance around you — in your home, office, schoolroom, or in the street. You don't have to look closely to see how much impact the products of modern chemistry have on your daily life.

Dyes and paints, synthetic fibres and solvents, and a wide variety of plastics, are all products of the chemical discoveries of this century, and mainly of the past half-century.

Then there are the less visible substances which are used in vast quantities, such as pesticides, fertilizers, and veterinary and human medicines. Without these products our lives would be very different.

People have become aware only recently of the fact that the chemical revolution may have a price: a price which may include danger to people and to the environment, if these substances are not handled safely during their manufacture, storage, use and subsequent disposal.

The number of chemicals made by man is enormous, and increases every year. Only a relatively few are known to be dangerous to humans and to the world around them. Of many others, we just don't know whether they are harmful or not and, if they are, why they are. Nor do we know whether there is a level of concentration below which no danger exists. Even if there is, it would be different for each of the thousands of compounds that exist today.

If we could discover these maximum safe levels, we could establish whether the toxic or dangerous properties of these materials could be controlled. If we found that, despite our best efforts, their manufacture, storage, use, or disposal still posed a threat, we would have to decide whether the benefits outweigh the risks.

Such a balancing act involving benefits and risks is used in a quite different aspect of life — in the management of travel on the roads. A stationary vehicle poses no problems, but when a driver gets behind the steering wheel and enters traffic, the risk of using the vehicle entails a real potential hazard.

Scientifically it can be proved that the number and severity of accidents is directly related to the speed at which the vehicle is driven. To reduce the hazard, a speed limit is set as a standard; the standard can vary according to the conditions — a higher speed limit can be set where the population is less dense, or where pedestrians and cyclists are excluded.

However, sometimes the public feels that the speed limit should be lower (or higher) than science would deem reasonable. Then a decision is made in which scientific evidence and the public's desire are balanced.

This is the equivalent of the synthesis discussed later in this article. A decision has to be made by all those affected as to whether the risks of using the roads under the proposed rules are outweighed by the benefits.

Eventually all parties agree on a speed limit (standard).

But the task does not end here. A strategy must be established for managing the risk. This could be done in the form of the highway code. It could be decided, for example, that all vehicles must have governors fitted so that they could not exceed the speed limit.

As a last resort, there could be formal enforcement using police with radar to apprehend offenders.

The task of the hazardous contaminants and standards branch is very similar: to deal with the problems of benefit and risk of the use of chemicals. It must assess the significance of each of the potential hazards of the multitude of chemical compounds. Then a priority is placed on the urgency with which each must be addressed. Standards or threshold levels must be established for the protection of the public and of the environment, and the activities of other branches of the Environment Ministry responsible for the management of these substances must be coordinated.

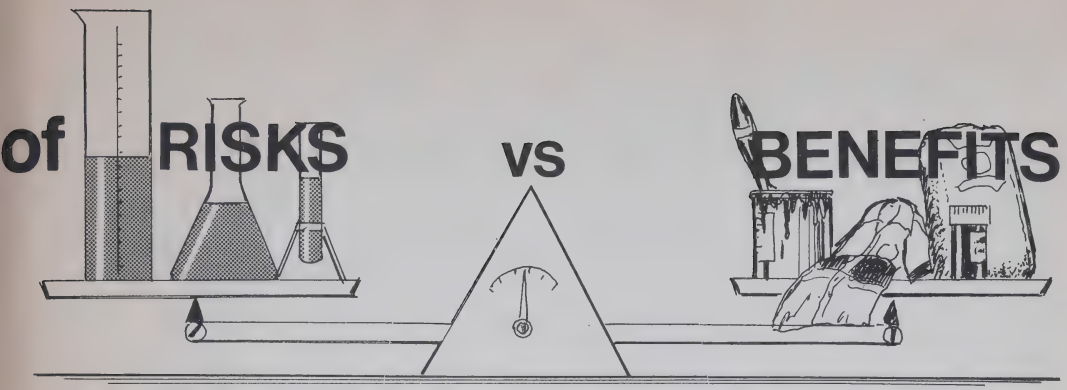
Essentially, these functions fall under three headings: Science, Synthesis, and Strategy.

Science

In Environment Ontario's hazardous contaminant and standards branch the scientific needs are being addressed by three sections: the agricultural and industrial chemicals section (AICS), the standards development section (SDS), and the standards implementation and planning section (SIPS).

The first step in the development of standards is the identification of hazardous substances, and this is the job of the Priority List Working Group (PLWG), an inter-ministry working group co-chaired by the members of the AICS. Their work is based on a list of 209 potentially hazardous substances determined by a thorough, world-wide search of scientific literature.

The group's mandate is to develop scientific methods for assessing the significance of chemical, physical and biological agents to allow the selection of those for which standards



should be set, to identify what knowledge on their effects is still lacking, and to recommend suitable resarch.

This task of risk identification has been assisted by surveys undertaken by the Canadian Chemical Producers Association and by Acres Consulting. Further surveys will be undertaken to expand this knowledge.

In addition, a Divisional Standards Steering Committee — including members drawn from the Hazardous Contaminants, Water Resources, and Air Resources Branches — has been established to decide which compounds will go through the full standard-setting process.

This committee will decide whether a substance can best be handled by a single branch, such as the air resources branch, handled by a group involving all appropriate branches co-ordinated by the hazardous contaminants and standards branch, or whether it should involve the full standard-setting process and be handled by all the appropriate branches.

Following the decision of the steering committee, the standards development section of HCSB will manage a process which will produce a scientific criteria document dealing with the effects of the substance on health and on the environment, the sources of the substance, the exposure levels, and the population at risk. This is the risk analysis stage.

Synthesis

The next step in the overall process of managing toxic substances in the environment is risk assessment. In this, factors in addition to the scientific information are considered and weighed to evolve a level of acceptable risk. It involves a variety of important considerations — legal, political, public, social and economic.

The process of risk assessment must take into account the legitimate, but often conflicting, interests of industry, environmentalists, municipal representatives, the news media, and many others. Many disciplines and professions should also play a part, including epidemiologists, physicians, toxicologists, biologists, industrial hygienists, economists, engineers, statisticians, and lawyers.

This raises the complex issue of public participation, in which input from all the various publics has to be synthesized to produce an acceptable standard.

Strategy

Finally, there is risk management. The purpose of this stage is to ensure that the exposure levels stated in the accepted standard are in fact what people and the environment are exposed to. This includes the range of control mechanisms which ensure that the standards that have been set are met by those who release, or who may release, hazardous substances into the environment.

The standards implementation and planning section is responsible for fitting the nature of the control to the degree of hazard. For example, cooperative control can include such things as guidelines or ministry recommendations for industry.
whether standards are being met, and

The next level involves restrictions — abatement and modification measures. Formal enforcement action requires a statutory basis in the form of regulations or environmental legislation. Finally, a substance could be banned altogether.

However, the process of choosing management options begins and ends with monitoring — a function which must be carried out in close cooperation with the ministry's regional offices. Only monitoring will show whether management measures are working.

guidelines and recommendations

In regulating the speed of traffic on our roads, and in regulating the use of chemicals, the technical, economic, and social risks must be balanced against the benefits to be gained from either of them to arrive at an acceptable solution.

The benefits derived from our use of chemicals are immense. The hazardous contaminants and standards branch's contribution is to bring together technical data and informed opinion from all walks of life — from science, from industry, and from the general public — so as to allow us to use these substances wisely, and with the least possible risk to ourselves and our environment.

Cooking the forest

More than 1.2 billion people live in areas where forests are being cut down faster than they are growing, reports the Food and Agriculture Organization of the United Nations. One of the reasons is the high consumption of wood for cooking.

Sewage sludge can be good fertilizer

Cutting costs.

No words could ring sweeter to a farmer's ears. Perhaps this is the reason many are looking to sewage sludge as an alternate method of fertilization for their crops.

One application of sludge to a field can suply sufficient phosphorus and nitrogen for the year's crop. The phosphorus and nitrogen (up to 490 lbs. per acre) can be worth as much as $465 per hectare per application.

Some of the metals in sewage sludge, if present in unduly high concentrations, adversely affect crop quality. In response to this, Ontario initiated research programs to determine what was necessary to safeguard farm land and crop quality when using sludge.

Research has identified 11 metals in sludge which, if allowed to accumulate in excessively high concentrations in soils, could affect farmland productivity and the food chain. However, through continuing research it has been found it isn't necessary or desirable to totally eliminate these metals. Small amounts of most are essential for human and crop well-being.

metals must be controlled

To explain the proper use of sludge for interested farmers, Ontario introduced Guidelines for Sewage Sludge. They were developed and approved by the Ministries of the Environment, Agriculture and Food, and Health.

Only sludges with acceptably low metal content can be applied to farmland at rates compatible with the crop's nitrogen and phosphorus requirements. The criterion is that the nitrogen application in any one year may not exceed the nitrogen requirements of the crop.

The guidelines outline what land is appropriate for sludge utilization with fact sheets explaining to the farmer how to apply to a municipal sewage treatment plant to get sludge for his land.

Restrictions, as explained in the guidelines, include a warning that animals should not immediately graze and crops should not be grown right away on land that has had sludge spread on it.

guidelines to be met

If sludge is available, farmers should have soils in their fields tested to determine the phosphorus level and soil pH. Samples are analyzed by the Ministry of Agriculture and Food to determine how much can be applied so as not to exceed provincial guidelines. These sludge guidelines stipulate that the amount of available nitrogen spread cannot exceed 135 kg/ha (120 pounds per acre) every five years. In addition, the sludge cannot exceed defined levels of heavy metals.

Once the soil sample is completed the farmer will receive a Certificate of Approval allowing him to apply for sludge spreading on his land.

Sewage treatment plant operators like to minimize sludge haulage costs by disposing of the sludge as close as possible to their treatment plants. Thus, the farther the farmer is away from the plant the less likely he is to get sludge for his land. Farmers more than 12 miles from a plant will not normally be able to get sludge, but in some cases users are more than 35 miles away. In most cases sludge is spread free of charge.

When a farmer starts to use sludge it is important for him to have good lines of communication with the hauler and the sewage treatment plant operator. He can then verify that the sludge quality is acceptable and find out how much nitrogen and phosphorus it contains. By being there when the sludge is spread, he can make sure the job is done right.

minimize costs

In many areas sludge spreading equipment, especially designed to minimize soil compaction, is available. Sometimes farmers use earthen storage structures to mix sludge with animal manure. They spread the mixture on their land later on, when convenient.

The use of sludge as fertilizer supplement has been successful in Ontario. Over one-third of the province's sewage sludge (1.5 million cubic metres) is used in crop production.

Ontario's Guidelines for Sewage Sludge Utilization on Agricultural Lands are now being revised in response to suggestions offered by the agricultural community, environmentalists and health officials. A new edition will spell out in detail the responsibilities of the sewage plant operator, the sludge hauler and the farmer.

For further information on sludge utilization, contact your local office of the Ministry of the Environment.

No waste burning at sea

The U.S. Environmental Protection Agency has refused to allow the burning of waste in special ships in the Gulf of Mexico. For the past three years, Chemical Waste Management has been trying to obtain a licence for the operation of two incinerator ships, Vulcan I and Vulcan II, for the destruction of DDT and PCBs at sea.

Waste burial restricted

New York State has announced new restrictions, effective March 15, 1984, on the land burial of hazardous wastes that can be disposed of by some other technology. Such higher technologies include liquid injection incineration, rotary kilns, liquid salt thermal treatment, plasma arc reactors and thermal treatment using supercritical water.

Sludge dumping at sea stopped

New York and other communities in the New York area will not be allowed to dump sewage sludge at a site 12 miles off the New Jersey coast, the U.S. Environmental Protection Agency has ruled. Such dumping will be allowed only 106 miles off the coast, and for only five years.

Finding a source of good groundwater

We've come a long way since water witching.

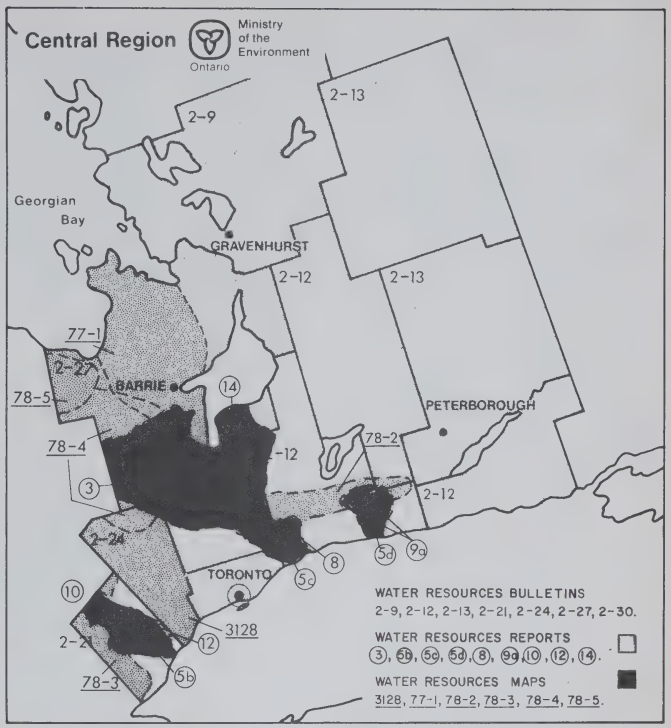
Farmers rely on groundwater sources for an adequate water supply, a principal necessity of many residence and agricultural operations. This water supply must not only be constant and dependable but also of a quality sufficient to meet all household and farming demands.

The process of finding a groundwater source has changed considerably. Groundwater was once located almost exclusively by "water witching", a method which has no scientific basis. Today, hydrogeologic methods have increased the probability of finding a good source of groundwater in many locations. Finding a groundwater source is, after all, not a mystical process but rather one that depends on a systematic approach, requiring the examination of all available information and a rational decision.

Groundwater can provide a relatively inexpensive and constant supply of high quality water. It is less susceptible to contamination than surface water and for the most part has a near constant yearly temperature ranging from eight to 12 degrees Celsius, unlike surface water temperatures which may fluctuate with changes in the season.

Groundwater, as it moves through the subsurface, picks up many impurities both through dissolving substances it encounters and carrying along contaminants such as bacteria, nitrates, spilled oil, etc. It is a common misconception that groundwater because it is "filtered" by soil is pure and therefore safe to drink. Many of the impurities in groundwater can be removed by treatment.

Standard procedures for collecting water samples, information on how to interpret the results, some of the common water-quality problems encountered in water supplies and the standard treatment methods to remedy these problems can all be found in "Water Wells and Ground Water Supplies in Ontario", published by the Ministry of the Environment.



The map indicates the areas for which bulletins, reports and water resources maps are available in Environment Ontario's central region. Corresponding information on the other areas of the Province can be obtained from the ministry's regional and district offices.

The construction of water wells has also changed considerably since the time when they were dug with pick and shovel to depths of a few tens of feet. Using modern drilling methods, wells may reach depths of 600 feet or more. Similarly, most water wells and water supply systems today are more reliable than their predecessors. A properly constructed well will probably never go dry or be contaminated by leakage from shallow polluting sources such as septic systems or surface drainage.

Information about well construction is also contained in "Water Wells and Ground Water Supplies in Ontario". Farmers looking for further information on wells and well construction should contact their local Environment Ontario office.

Liming by boat

Limestone can be spread on acidic lakes very efficiently by a method developed by a Swedish company, Idemekaniska Systems AB. The company has developed a shallow-draft boat into which lake water is pumped, mixed with dry lime and then ejected as a slurry over the surface of the lake. The company claims that its boat can spread six tons of lime in 15 minutes.

Profile

Mike Harris, MPP, Parliamentary Assistant

Ontario Ministry of the Environment co-ordination of provincial and federal environmental initiatives can be viewed as "an excellent example of the cooperative approach to problem solving", says Nipissing MPP Mike Harris.

Mr. Harris, who was appointed Parliamentary Assistant to the Minister of the Environment in August 1983, is heavily involved in Environment Ontario's fight against acid rain. He describes his role in the ministry as a support for Andy Brandt.

"My job is to be aware of the issues and to assist the minister with legislation in the house. My function is to be as supportive to the ministry and to the minister as I can."

"The acid rain issue is one that should be nailed down a little finer than it is," says Mr. Harris. "There will be issues that come along in the next 10 years with the magnitude of acid rain. If we establish a solid procedure to deal with acid rain now, it may serve us well in dealing with future issues that are affecting our environment."

The responsibility of Environment Ontario is to provide a safe environment for the province of Ontario, but this means constantly adapting to new technology.

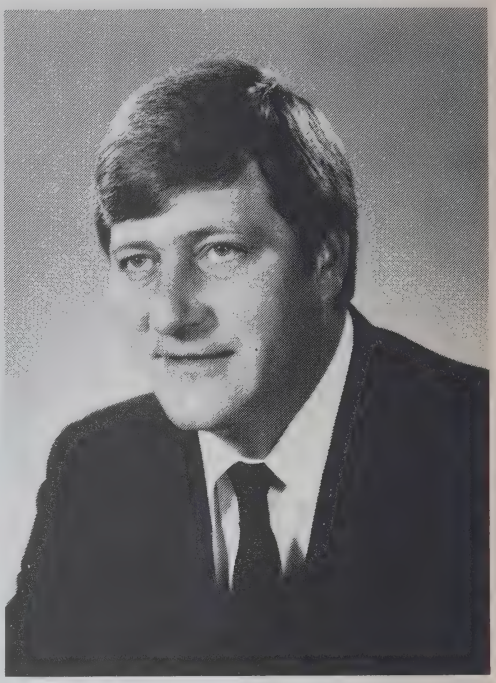
"Standards and procedures are set by legislation or regulation for the safety of our air, water and land. But these regulations must be constantly updated due to advancing technology. This ministry must be ready to change at all times," says Mr. Harris. "The ministry has goals for Ontario. This means maintaining liaison with the federal government as well as labour and industry to work out the mechanics and financial aspects of achieving these goals."

Another facet of Mr. Harris' work as a Parliamentary Assistant is dealing with public fear.

"The biggest problem we have is irresponsible claims of what problems really are. It is irresponsible to misrepresent information and create unnecessary fear. If facts are presented in an erroneous or shocking way, it is difficult for a government ministry to get the true facts out and to make people understand issues.

"For example with chemicals in our drinking water, we are now able to identify levels that are minute," he says. "As we keep refining our techniques, we'll find more compounds, but in quantities that are not a problem."

Elected to the Ontario Legislature March 19, 1981, the North Bay native served on the executive of the Northern Ontario Trustee Association from 1976-1981. He belonged to the Nipissing Progressive Conservative Association from 1977-1978, and to the Parry Sound P.C. Association from 1978-1981. Before joining Environment Ontario, Mr. Harris was chairman of both the Standing Committee on Resources Development for about two years, and the Legislature's Standing Committee on General Government in 1983.



Before entering full-time politics, Mr. Harris owned and operated a ski hill from 1968 to 1983, and was a teacher with the Nipissing Board of Education from 1969 to 1971. He has been a member of the Canadian Ski Instructors' Alliance since 1964 and was involved in the North Bay Ski Racing Club. He also served on the Nipissing Board of Education from 1975-1981, six years as chairman.

"I started teaching and ran my ski hill at the same time. When I found that the ski hill was taking up too much time, I had to give up one or the other. So I gave up teaching, although I enjoyed it very much," says Mr. Harris.

Mr. Harris also enjoys golf and manages Pinewood Park Golf Club in North Bay. He has been a member of the Northern Ontario Professional Golfers' Association and the Canadian Professional Golfers' Association since 1977. He also enjoys Bridge and getting out on Lake Nipissing with his wife Janet.

Mr. Harris will take his future in politics step by step.

"I didn't enter politics with a specific personal goal in mind," he says. "The first step was to become comfortable as a provincial member, and then to work as hard as possible for the next four years to accomplish what I can on behalf of my constituents and on behalf of the people of Ontario."

It's all one world...

More than air, water and land

Current pollution control laws are based on the medium in which pollution occurs, but evidence is accumulating that this approach to pollution control demands radical rethinking, writes J. Clarence Davies, executive vice-president of the U.S. Conservation Foundation, in "Environmental Science and Technology." The medium-controlled approach, he says, is probably not capable of dealing with toxic substances, and it may not work for many conventional pollutants.

To support the contention, the U.S. magazine cites a few examples:

— Studies indicate that air pollution from sewage treatment plants may contribute as much to human health risk as do more traditional point sources.

— Toxic contamination of the Great Lakes cannot be dealt with without dealing with the deposition of toxics from air.

— Waste disposal sites on land are now a major source of water pollution and perhaps air pollution as well.

Industrial plants, Mr. Davies writes, also often release the same pollutant to more than one medium. But regulatory permits controlling effluents or emissions are often issued at different times by different agencies operating under different statutes. Thus, he says, no consideration is given to the best way of dealing with pollution, or to the most efficient method for meeting all the control requirements applicable to a given source.

Waste management, according to the article, typically consists of applying end-of-the-pipe controls. This approach often simply transfers pollutants from one medium to another, rather than reducing the amount of waste or placing pollutants in the medium where they will do the least damage.

People and the environment may be exposed to the same pollutant in more than one way. A person may absorb a solvent through direct contact, breathe it in the air and ingest it with drinking water. Yet standards are usually based only on the ambient quality of air; they do not reflect the total exposure of the person, plant, or ecosystem.

Successful environmental protection is dependent on our understanding of the transport and fate of pollutants. Regulatory systems, scientific investigations, engineering and monitoring are being narrowly focused on a single medium without regard to cross-media transfers. Only a serious consideration of changes in policies and institutions is likely to produce the scientific and technical information necessary to make the new approaches feasible.

The cross-media consideration of environmental problems is fundamental to the evaluation and reconsideration of the whole gamut of existing efforts to deal with pollutants.

Lebanon does not worry

After nine years of civil war, concern about the environment and about ecology seems to be one of the lesser problems facing Lebanon. That country today is an ecological disaster zone stretching from the seabed to the top of the mountains, reports the New York Times.

Fishing, for example, means going out in a boat, locating a school of fish, throwing a stick of dynamite at them and scooping up the stunned prey. As a result, once-abundant fish have become scarce and Lebanon must now import seafood.

The Mediterranean Sea has become Beirut's open sewer. Diving off the coast, scuba divers discovered a mammoth undersea junkyard of cars, school busses, shoes, car batteries, old tires and other refuse mixed with waste from factories that produce textiles, fertilizers, plastics and other products.

This dumping has clouded the water, blocking sunlight and destroying oxygen-producing vegetation. Only the poor now go swimming in the sewage-infested sea.

Recently, the government confiscated 72,000 frozen chickens that had gone bad. A week later thousands of dead chickens, infested with flies and maggots, could be found — and smelled — along the sea shore.

On land, the situation is not any better. Shooting of birds has become a way of venting anger and Germany and the Netherlands have protested to the Lebanese government over the machine-gunning of storks that fly over Lebanon during their migration.

Because so many birds are killed, insects proliferate and are slowly destroying the pine forests. Since there are no forest rangers anymore, whole forests are eradicated by peasants or soldiers with chain saws. The famous cedars of Lebanon are becoming an endangered species.

Eastern countries lower SO_2

Eastern Block countries have, for the first time, decided to do something about acid rain — the Soviet Union, Bulgaria and East Germany have agreed to reduce their transboundary emissions of SO_2 by 30 per cent.

Dr. Albert Edward Berry, MD †

Dr. Albert Edward Berry, one of Ontario's first environmental pioneers, died in St. Marys, Ontario, on Friday, October 19, 1984.

As medical doctor and engineer, Dr. Berry was the province's leading advocate of water and sewage treatment and pasteurization when typhoid and similar water-borne diseases were affecting the health and lives of the people of this province.

Following World War I, Dr. Berry joined the Department of Health of the province of Ontario and rose to become the chief engineer of the sanitary engineering division of that department. Subsequently, he was appointed the first general manager and chief engineer of the Ontario Water Resources Commission, the forerunner of today's Ministry of the Environment. In this position he was responsible for the updating of water and sewage treatment facilities across the province. His pioneering spirit, his dedication, and his expertise in the field were second to none.

Dr. Berry was awarded the Order of Canada for his contribution to environmental engineering. He was the only man who served as both the President of the American Water Works Association and the Water Pollution Control Federation. After he retired in 1963 he became a consultant to the World Health Organization and travelled throughout the world helping other countries, particularly those in the third world, to correct their water supply problems thereby safeguarding and improving the health of their citizens.

In 1977, Dr. Berry's name was entered into the Engineering Alumni Hall of Distinction. In 1981 the Water Pollution Control Federation awarded Dr. Berry the Gordon Maskew Fair Medal for his contribution to engineering training.

Dr. Berry has been eulogized as "Canada's most distinguished environmentalist."

Ontario

Ministry of the Environment

Hon. Andrew S. Brandt
Minister

Dr. Allan E. Dyer
Deputy Minister

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